A STUDY

OF

ANEURISM OF THE PULMONARY ARTERY.

WITH THE REPORT OF A CASE.

BY

CHARLES B. WILLIAMS, A.B., M.D.,

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A STUDY OF ANEURISM OF THE PULMONARY ARTERY, WITH THE REPORT OF A CASE.

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[Read January 8, 1890.]

A CAREFUL study of recorded cases shows several varieties of dilatation of the pulmonary artery. The first and by far the most common variety is a general dilatation of the trunk and primary branches. Next in frequency comes sacciform dilatation. The artery in some cases of sacciform aneurism has been dilated to the size of a pomegranate, and the case recorded by Dr. Sydney Coupland,[1] in 1875, showed a dilatation of six and one-eighth inches in circumference. Fusiform dilatation is also found. I have found reports of but two cases of dissecting aneurism of the pulmonary artery. Finally, we have the arterio-venous aneurism, where there is a communication between the aneurismal sac and the ductus arteriosus. The only case of this variety known to me is that recorded by Drs. Balfour and Smith, in 1879.[2] The diagnosis in this instance, however, was inferential and based on negative signs, for the patient was living when the article was published.

Aneurisms of the pulmonary artery, such as I have been considering, are for the most part usually situated on the trunk. But the dilatation has extended to the main branches and even to smaller ramifications of the artery.

Through a process of atheromatous change multiple aneurisms of the pulmonary artery are often formed on the walls of old phthisical cavities; and through erosion or sudden bursting of the walls of these aneurismal sacs a fatal hæmoptysis has frequently occurred. Buhl and Zenker[3] have described such cases, and Jos. Cornet,[4] in an elabo-

[1] Vide appended table of cases.

[2] Vide table of cases.

[3] Virchow's Archiv., 1862, p. 183.

[4] Cornet: Contribution à l'étude des anévrysmes de l'artère pulm. Paris, 1885.

rate thesis, has recorded thirty-four cases of peripheral aneurism of the pulmonary artery occurring in phthisical cavities.

Dr. William Aitken,[1] of Edinburgh, records a case of a soldier who had died suddenly of hemorrhage from the lungs. On opening one of the tubercle cavities it was found filled with coagulated blood, and projecting from a spot on the wall of this pulmonary cavity was a round tumor of the size of a walnut. The tumor had ruptured and the rupture held a coagulum of blood. The tumor was found to be an *ectasis* or aneurismal dilatation of the pulmonary artery. Several other tumors of a similar nature but of much smaller sizes existed in other cavities in the lungs, projecting from the pulmonary artery.

The causes of aneurism of the pulmonary artery are chronic endarteritis or atheroma, syphilis, great pressure in the pulmonary circulation as in marked mitral stenosis or insufficiency, collapse or emphysema of lung with great hypertrophy of the right ventricle, and patency of the ductus arteriosus.

The symptoms of aneurism of the pulmonary artery are lividity of face, dyspnœa, cough, dysphagia, headache, pain in the chest and epigastrium. The principal physical signs that have been recorded are a systolic pulsation and tremor (sometimes also diastolic) between the second and third ribs of the left side near the sternum, perceptible in a decreasing degree downward but wholly wanting above the clavicle; a very loud, superficial, rough, systolic murmur propagated to the left and upward above the clavicles and over the whole præcordial region, but loudest upon the prominence between the two ribs mentioned. The above physical signs and symptoms are by no means constant; and even should they all be present they might be caused by aneurism of the aorta or by a mediastinal tumor lying over the vessels.

It is claimed that a means of establishing a differential diagnosis between aneurism of the aorta and pulmonary aneurism can be made by observing the cardiac hypertrophy and dilatation. If it should prove to be on the left side of the heart, aneurism of the aorta is indicated; if on the right side, pulmonary aneurism.

The differential diagnosis between subclavian aneurism and aneurism of the pulmonary artery may be made from the fact that a pulsating tumor above the clavicle points to subclavian aneurism, while such a pulsation, on the other hand, is entirely absent in pulmonary aneurism.

[1] Science and Practice of Medicine, by Wm. Aitken, M.D. Edinburgh, 1868.

The treatment of aneurism of the pulmonary artery is the same as in other thoracic aneurisms. And, probably, the method that will give most success is that instituted by Mr. Tuffnell; *i. e.*, a careful regulation of diet, a definite quantity of solids being administered at stated intervals, the object being to support life with as little food and drink as possible. Potassium iodide and subcutaneous injections of ergotine have been also recommended.

Lichtheim,[1] after a series of thirty-three experiments, mostly made on dogs, seems to have shown that ligation of a pulmonary artery is without any effect upon arterial blood-pressure, hence, any operative treatment of this kind in aneurism of the pulmonary artery would be useless.

My attention was called to the subject of pulmonary aneurism by having the following case put under my professional care by Dr. John B. Roberts, a short time before the patient's death.

Aneurismal dilatation of the pulmonary artery and its primary branches, mistaken for subclavian aneurism.—John B., æt. forty, colored, a laborer, applied to the Philadelphia Polyclinic Hospital for treatment on July 19, 1887, with the following history:

Family history negative. Personal history: at the age of twenty-two he had gonorrhœa and chancroid. In 1875 he had specific disease and chancre, but no secondary symptoms followed. In 1879 he took a severe cold followed by cough; and during this time he had a slight hemorrhage, the blood being light-colored. Two months later he had hæmoptysis, the blood being dark-colored. In a short time the patient became very weak. At present he has dyspnœa, but no pain. His appetite is poor; bowels are regular. On July 21, 1887, Dr. Thomas J. Mays made an examination, and from his clinical records the following notes were obtained:

Physical signs: Dulness on percussion below the left clavicle from the sternum to the shoulder-joint. A low systolic bruit is heard over this region, as well as a very perceptible thrill to the fingers. The systolic bruit is propagated over the whole cardiac area and into the axilla. The maximum intensity is, however, at the junction of the first intercostal space with the sternum. There was no bulging whatever. No cardiac conditions were noted. The left radial and axillary pulse is weaker than on the right side. He has frequent pains shooting down his left arm. A diagnosis was made of left subclavian aneurism, possibly of syphilitic origin.

The patient was treated with iodide of potassium, arsenic, nitroglycerin, atropine, strophanthus, etc., in accordance with his symptoms; but no marked improvement occurred. He was then transferred to Dr. John B. Roberts's care, who admitted him to his ward in St. Mary's Hospital on August 20, 1887.

[1] Lichtheim, L.: Die Störungen des Lungenkreislaufs, etc. Breslau, 1876.

Dr. Roberts now called a consultation of the surgical staff of St. Mary's Hospital, and the diagnosis of subclavian aneurism was concurred in by Drs. Keen, Mears, and Grove. It was decided to ligate the subclavian and carotid arteries unless improvement followed confinement to bed and very restricted diet associated with large doses of potassium iodide. The patient was accordingly put to bed, allowed exceedingly small quantities of milk and beef tea, not permitted to leave his bed even to go to the water-closet, but was enjoined to lie perfectly quiet and given as large doses of potassium iodide as he could take without toxic symptoms.

As soon as interference with digestion or irritation of the mucous membranes resulted from iodism, the dose was diminished. The exact quantity taken in twenty-four hours cannot now be definitely determined. It was, probably, in the neighborhood of two drachms per diem. Under this treatment he continued for about twelve weeks. His condition improved, the thrill in the subclavicular region became almost extinct, and in every respect the patient was vastly better. Confinement to bed, however, became so irksome to him that he finally insisted upon getting up and returning to his home on December 4, 1887.

Dr. Roberts saw him once or twice at his own home during the winter of 1887 and 1888, and finding him not as well as when he was in the hospital, but in a very fair condition, advised at that time the operation mentioned above. This was, however, declined by the patient.

Nothing further was heard of the patient until the spring of 1889, when Dr. Roberts was asked to see him subsequent to a profuse hæmoptysis. It was then stated by the patient that in the interim of treatment he had got along quite well and had been frequently out and about the streets and was well enough had he been a man of affairs to have attended to ordinary business engagements, though, of course, heavy physical labor would have been impossible. He was treated with fluid extract ergot, ammonium bromide, tonics, etc., for the hæmoptysis, excessive cough, and grave debility. It was stated that at one time he lost about one pint of blood. This seemed to relieve the dyspnœa and he was, therefore, made more comfortable. There was also profuse muco-purulent expectoration. He was then admitted into Dr. Roberts's ward at St. Agnes's Hospital, June 22, 1889.

In May, 1889, a note was made that there was marked bronchial breathing on the right side of the chest, subcrepitant râles on both sides, and a good deal of cough—though cough was not so excessive as it had been.

The fact that the aneurism had not increased in size since Dr. Roberts had seen him previously, which was nearly a year and a half, and that there was no bulging forward or evidence of erosion of the sternum or ribs, made him suspicious as to the aneurismal character of the growth, and he, therefore, suggested the possibility of the disease being a vascular sarcoma located within the chest. Operation had been deferred at the time the patient was in St. Mary's Hospital because of the improvement under medicinal treatment. And at the present time the fact that no increased development was apparent rendered operation questionable, especially as the man evidently was the subject of phthisis.

Upon his admission to St. Agnes's Hospital the patient was very weak, had great dyspnœa, was the subject of harassing cough with expectoration,

and was evidently in a precarious condition. June 22, 1889, a physical examination was made by Dr. J. P. Crozer Griffith, an abstract of whose notes made by Dr. Thomas Vincent, the resident physician, is as follows:

No abnormal pulsations were noticed in the neck. Dyspnœa generally marked on talking. Expansion of the right side was much greater than that of the left side. Supra-clavicular fossa was more clearly depressed on the right side than on the left side. No bulging anywhere in the intercostal spaces; they were about normal on both sides. No marked difference in vocal fremitus.

Percussion of lungs: right side anterior, full and resonant. Left side supra-clavicular fossa, resonance over clavicle, and extending downward to about the first intercostal space decidedly impaired.

The resonance of the manubrium was normal, the impairment commencing with the cardiac dulness.

Axillary resonance normal.

Right supra-spinous and back of supra-clavicular fossa: fine crackling râles heard on inspiration. Expiration prolonged and somewhat bronchial. Infra-clavicular fossa gave much the same inspiration, and the expiration was prolonged. Over the right side of chest a murmur was noted, and fine râles occurring with expiration. Left supra-clavicular fossa: numerous small mucous and some fine râles, with the bruit over the respiratory sound.

Over the left chest: respiratory sounds feeble, with numerous mucous and submucous râles. Posteriorly, infra-spinous fossa: both sides somewhat impaired. Infra-spinous fossa, negative. Elsewhere in the chest, negative. Right side, auscultation negative. Left side, auscultation supra-spinous fossa: numerous mucous râles heard. Inspiration feeble. Infra-spinous fossa, and elsewhere over the chest, numerous râles. Respiration bronchial in character.

Heart: In first left interspace from the boundary of the sternum outward about two inches, was a very distinct thrill, but no expansile pulsation. Apex beat very feeble, and only felt in the fourth and fifth interspaces within the nipple line when the patient was leaning outward, or on full and held inspiration.

Auscultation of heart: at apex of heart a low-pitched systolic murmur was heard. Second sound clear. Over the xiphoid cartilage a ringing second sound was noted, and a high-pitched systolic murmur. Over a portion of the chest there was a loud systolic bruit. There was no diastolic murmur. A systolic murmur could be heard faintly in the left carotid, and likewise a loud murmur above the left clavicle. The murmur was faintly heard in the left axilla. There was a faint murmur in the left supra-spinous fossa, but none elsewhere in the back.

Right radial artery: normally full tension. Left radial artery: scarcely perceptible.

The patient died August 14, 1889.

An autopsy was made by Dr. C. L. Bower, and it was found that the patient had tuberculosis of both lungs and an aneurism of the pulmonary artery and its primary branches. The pleura was noted to be full of adhesions. The remaining organs were normal in their condition.

An examination of the aneurism showed that the pulmonary artery for

about four inches from the heart was dilated symmetrically—the dilatation extending also to the primary branches. There was no sacculation, the form being more like that of a fusiform aneurism. The cavity at the greatest diameter of its dilatation was about two inches, and corresponded with the position of the ductus arteriosus. The ductus arteriosus seemed wider than normal, and on the pulmonary side appeared to be patulous. On the aortic aspect, however, it was normally closed. The inner coat of the pulmonary artery showed no disease, and was not the seat of fibrinous clots, but contained chicken-fat clots. The aorta showed several atheromatous patches.

Dr. W. H. Porter, Curator of the Presbyterian Hospital, New York City, has compiled a record of cases of pulmonary aneurism. I have added a few more cases not contained in Dr. Porter's list, and think that this list now contains nearly all recorded cases up to date.

Recorded Cases of Pulmonary Aneurism.

Previous to 1561: *Ambroise Paré.*—Body of artery dilated to the size of a fist, and its lining membrane quite ossified. Patient died suddenly from rupture of vessel while playing at ball. Observations on Aneurism. By John E. Erichsen. London, 1844.

1749: *Lanciscus.*—The patient, a hatter, "in consequence of too great exertions, especially of an afternoon, in beating the felt of which hats are made, and inhaling at the same time coal-smoke mixed with a watery vapor, became affected with dilatation of the pulmonary artery." De motu cordis et Aneurismatibus. Lugduni Bat. 1749.

1810: *Starts.*—The aneurism arose during life at the right side of the thorax to the size of two fists: callus of sternum, and of fourth and fifth ribs, were separated from termini of osseous part of ribs, and the aneurism was thus placed outside of the thoracic cavity. Abh. d. Phys. Med. Soc. Zu Erlangen, 1810, I. 472.

1825: *Mr. Adam.*—Vessel considerably dilated, to nearly four times its natural size, probably aneurismal. Sudden death from spontaneous rupture of the pulmonary artery. Aorta and other large vessels issuing from its arch completely ossified. Trans. Calcutta Med. Soc., vol. ii., 1826.

1841: *Mr. Foster.*—Male, æt. forty-one. Aneurism of the branches of the pulmonary artery. Cause of death, hæmoptysis. Lancet, 1841.

1843: *Dr. Peacock.*—Male, æt. twenty-nine. Aneurism of the branches of the pulmonary artery. Cause of death, hæmoptysis. London and Edinburgh Monthly Journal Med. Sci., vol. iii., 1843.

1844: *Skoda.*—Trunk of pulmonary artery dilated to the size of a goose's egg. The tunics of the aneurismally enlarged pulmonary artery exhibited the same changes seen in aneurisms of the aorta. Abhandlung über Perk. und Auskult. Wien, 1844, p. 311.

1848: *Dr. Dlauhy.*—Sacciform aneurism of the size of a large walnut. The pulmonary artery was in a state of well-marked atheromatous degeneration. Viertelj. für Prakt. Heilk., 1848.

1849: *Dr. Hope.*—Pulmonary artery dilated to four and a half inches in circumference. Diseases of the Heart, by Hope, 1849, and case 84 Table of Arteries.

1859: *Dr. Bristowe.*—Thickening and dilatation of the pulmonary artery and its ramifications. Pulmonary artery up to its bifurcation uniformly dilated. Circumference before bifurcation, four and seven-eighths inches. Trans. Path. Soc. London, 1859–60, vol. xi. p. 80.

1866: *Dr. Conway Evans.*—General dilatation of the pulmonary artery and hypertrophic thickening of its walls, with atheroma of the internal coat, and a contracted mitral orifice. Trans. Path. Soc. London, 1866.

1866: *Prof. Gilewski.*—Sacciform dilatation of pulmonary artery, circumference of vessel being equal to that of a pomegranate. The sac involved the trunk of the artery, and its two short branches arose immediately from the sac. Wiener med. Woch., Nos. 33–38, 1868.

1874: *Dr. Dowse.*—Woman, æt. nineteen. At the root of the pulmonary artery was a globular tumor of the size of a pullet's egg. Vegetations on the pulmonary valves; right ventricle dilated and tricuspid valve incomplete.—Lancet, 1874, vol. ii.

1875: *Dr. Sydney Coupland.*—Man, æt. seventy-five. Dilatation of pulmonary artery and its branches. Main trunk dilated to a circumference of six and one-eighth inches. Valves incompetent and arterial walls greatly thinned. Great hypertrophy and dilatation of right heart. Marked emphysema of lungs and some degree of patency of foramen ovale. Path. Trans., vol. xxvi., 1875.

1879: *Drs. George W. Balfour and A. Wood Smith.*—Probable case of aneurism of the pulmonary artery and the ductus arteriosus. Diagnosis inferential and based on negative signs. Glasgow Medical Journal, 1879, xii. pp. 103–108.

1881: *Dr. J. F. Duffield.*—Female, æt. fifty. Pulmonary artery and its right and left branches widely dilated throughout. Pulmonary valve and artery showed marked evidence of advanced atheromatous degeneration. The right pulmonary artery was the site of a large aneurism which commenced at the junction of the superior and anterior portion as a *dissecting* aneurism. Diameter of tumor was two inches. The left pulmonary artery had an aneurism of the same size and situated at the same point. The arteries springing from the left aneurism were also dilated even to the very surface of the lung. Amer. Journ. Med. Sci., N. S., vol. lxxxiii. pp. 77–82.

1881: *M. Rêvilliod.*—Female, æt. thirty-six. A communication between the two ventricles. Stenosis of the pulmonary artery and a *dissecting* aneurism of the same artery. The pulmonary artery was a little retracted from its origin. It measured sixty millimetres in circumference and showed a transverse rupture which dissected the internal and middle coats. The artery was covered with a great number of atheromatous patches. Bull. de la Soc. Anat. de Paris, 1881, pp. 589–591.

1882: *A. Wolfram.*—Diagnosis: insufficiency of mitral valve; subsequent hypertrophy and dilatation; pulmonary emphysema. Aneurism of pulmonary artery, probably congenital; branches gradually dilated. Bronchitis, parenchymatous nephritis; general anasarca. Gaz. lek. Warszawa, 1883, 2 s. iii. 447–466,

1884: *N. J. Grigoriev.*—Insufficiency of valves of pulmonary artery near the division of the right and left branches of the artery. Sacciform aneu-

rism of the pulmonary artery, thrombus of the left popliteal artery near the termini of the posterior tibial artery. Med. Obozr. Mosk., 1886, xxv, 3–7.

No date.—Specimen No. 90 in Museum of St. Bartholomew's Hospital, London. Aneurism of the left branch of the pulmonary artery with a deposit of fibrin. The case was that of a female æt. fifty-three.

1889: *Dr. C. B. Williams.*—Male, æt. forty. Aneurism of the pulmonary artery and its primary branches. Pulmonary artery for about four inches from the heart was dilated symmetrically, the dilatation extending also to the primary branches. A fusiform aneurism, the greatest diameter of which was about two inches and corresponded with the position of the ductus arteriosus.

The following are recorded cases of aneurism of the pulmonary artery, all, or nearly all, of which are cases of peripheral aneurism occurring in phthisical cavities:

ANEURISMS OF PULMONARY ARTERY.

Bennett: Dublin Quart. Journ. Med. Sci., 1872.
Birkett: Med. Times and Gaz., London, 1869.
Bramwell: Edinb. Med. Journ., 1877.
Buchwald: Deut. med. Wochenschr., 1878.
Carrien: Gaz. hebd. Montpel., 1879.
Church: Trans. Path. Soc., London, 1869.
Cotton: Med. Times and Gaz., London, 1866.
Cotton (A. P.): Brit. Med. Journ., London, 1868.
Dlauhy: Viertlj. f. pr. Heilk., Prag, 1848.
Fagge: Trans. Path. Soc. London, 1877.
Fearn: Lancet, London, 1840.
Finlayson: Brit. Med. Journ., London, 1877.
Franks: Dublin Journ. Med. Sci., 1876.
Green: Trans. Path. Soc. London, 1871.
Headland: Lancet, London, 1870.
Heath: Trans. Path. Soc. London, 1867.
Homolle: Progrès Méd., Paris, 1876.
Laure: Lyon Méd., 1873.
Lebert: Berlin. klin. Wochenschr., 1876.
Lepine: Bull. Soc. Anat., Paris, 1874.
Lionville: Ibid., 1875.
Moxon: Trans. Path. Soc., London, 1867.
Reynaud: Bull. Soc. Anat., Paris, 1874.
Refleximate: Rec. d. méd., etc., 1822.
Rindu: Bull. Soc. Anat., Paris, 1874
Salazar: Siglo Med., Madrid, 1874.
Sevestre: Bull. Soc. Anat., Paris, 1873, etc.
Silver: Trans. Path. Soc., London, 1873.
Smith: Glasgow Med. Journ., 1879.
Verardini: Rend. Accad., Bologna, 1870.
Williams: Trans. Path. Soc., London, 1866.

List of Cases recorded since 1880.

Damaschino: Union Méd., Paris, 1883.

Mioton: New Orleans Med. and Surg. Journ., 1880, 1, N. S. viii.

Poupon: France Méd., Paris, 1884, I. 687.

West: Lancet, London, 1884, I. 70.

Ducartel: Bull. et mém. Soc. méd. et Hôp. de Paris, 1884, 4, s. I. 154.

Cornet: Contribution à l'étude des anévrysmes de l'artère pulm., No. 315, Paris, 1885.

Haushaltos: Un cas d'anévrysmes, etc. Rev. de méd, Paris, 1889, ix. 368.

Osler (*W.*): Aneurismal dilatation of branches of pulmonary artery on the walls of phthisical cavities. Montreal General Hosp., 1877, I. 30.

West (*S.*): Two cases of pulmonary aneurism of large size, with profuse and recurrent hæmoptysis, etc. Trans. Path. Soc. London, 1883, 4, xxxv. 93.

Kidd (*P.*): Unusual cases of pulmonary aneurism. Trans. Path. Soc. London, 1883, 4, xxxv. 98.

West (*S.*): Case of aneurism of branch of pulmonary artery. Trans. Path. Soc. London, 1878, xxix. 41.

Duffield (*J. F.*): Aneurism of right and left pulmonary arteries. Amer. Journ. Med. Sci., Phila., 1882, N. S. lxxxiii. 77.

West (*S.*): Case of —. Trans. Path. Soc. London, 1881, xxxii. 67.

Williams (*J.*): Sudden death from hæmoptysis in consequence of rupture of an aneurism of a branch of the pulmonary artery. Australian Med. Journ., Melbourne, 1881, N. S. iii. 349.